



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

User Documentation for Version 5

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AIRS Science Team Meeting

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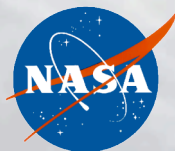
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Outline

Atmospheric Infrared Sounder

- **Proposed Version 5 User Documentation**
 - *Contents of Document Package*
 - *Candidate L2 Standard Products for Quickstart Entry*
 - *Example L2 Product Quickstart Entry*
 - *Required Flow Charts for Retrieval and Quality Flags*
- **Requested Contributions (due April 6, 2007)**



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Contents of Document Package

Atmospheric Infrared Sounder

- **V5 Test Report (Thomas Hearty and cast of thousands)**
- **V5 User Guide**
 - *Main User Guide (overview)*
 - *Differences between V4 and V5*
 - *Data Disclaimer (provides all known caveats)*
 - *Proc File Description (Evan Manning Document)*
- **Supporting Documents**
 - **L1B**
 - *QA Quickstart Documents for MW and IR*
 - *IR Channel Properties Files*
 - *VIS Documentation (unchanged from V4)*
 - **L2**
 - *QA Quickstart Documentation*
 - *Description of Levels and Layers*
 - *Standard and Support Pressure Levels*
 - *Channels Used in Retrieval, by use (from NAMELIST)*
 - *Standard Product Quickstart (1 to 3 pages per product full swath product)*
 - **L3**
 - *Quickstart Documentation*
 - *Product Quickstart (1 to 3 pages per product)*
 - **Calibration Subset**
 - *Quickstart Documentation*
 - **Readers**
 - *IDL, MATLAB, FORTRAN, C*



Candidate L2 Standard Products for Quickstart

Atmospheric Infrared Sounder

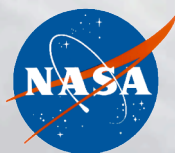
- **L2 Products**

- *TairStd, TsurfAir, TsurfStd, emisIRStd, H2OMMRStd, totH2OStd, H2OMMRStd, H2OMMRStd_liquid, num_H2O_Func, H2O_verticality, totO3Std, O3VMRStd, num_O3_Func, O3_verticality, O3_dof, CO_total_column, num_CO_Func, CO_VMR_eff, CO_verticality, CO_dof, CH4_total_column, num_CH4_Func, CH4_VMR_eff, CH4_verticality, CH4_dof, Ptropopause, T_Tropopause, TCldTopStd, PCldTopStd, CldFrcStd, olr, clrolr, totCldH2OStd, dust_flag, and the MW-only products*

- **Associated Quantities**

- *Startup, PsurfStd, Qual_Guess_Psurf, RetQAFlag, MWSurfClass, spectral_clear_indicator, topog, topog_err, landFrac, landFrac_err*
- *Pbest, Pgood, Qual_Temp_Profile_{Top, Mid, Bot}, Qual_Surf, Qual_H2O, Qual_O3, Qual_CO, Qual_CH4, Qual_clrolr*
- *TAirStdErr, TSurfAirErr, TsurfStdErr, emisIRStdErr, H2OMMRStdErr, totH2OStdErr, totO3StdErr, O3VMRStdErr, CO_VMR_eff_err, CH4_VMR_eff_err, TCldTopStdErr, PCldTopStdErr, CldFrcStdErr, olr_err, clrolr_err, totCldH2OStdErr, and errors for MW-only products*

- **Information from the L2 Quickstart documentation will be carried through to the L3 Quickstart documentation**



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Example L2 Standard Product Quickstart Entry (similar documentation for other products)

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*AIRS Temperature Profile, **TAIRStd**, and Surface Air Temperature, **TSurfAir***

1. Description

TAIRStd is the retrieved air temperature profile on a pressure level of **pressStd** (see **V5_L2_Standard_Pressure_Levels.pdf**). It is reported on the pressure level at which it applies, of which there are 28. Level 2 Standard pressure levels are arranged in order of decreasing pressure. The highest altitude pressure level is $\text{pressStd}(28) = 0.1$ mb. The index of the lowest altitude pressure level for which a reported **TAIRStd** is valid is **nSurfStd**, which may be 1, 2, ..., 15 depending upon topography. The surface pressure, interpolated from the forecast, is **PSurfStd**. The surface air temperature is **TSurfAir**, and both it and **TAIRStd** are obtained from the support product air temperature profile, **TAIRSup**, using linear interpolation.

2. Type of Product

level quantity (see **AIRS_L2_levels_and_layers.pdf**)

3. Units

degree Kelvin (K)



Example (continued)

Atmospheric Infrared Sounder

AIRS Temperature Profile, TAIRStd, and Surface Air Temperature, T_{SurfAir}

4. Quality Factor

(see [AIRS_L2_Quality_Factor_QuickStart.pdf](#))

These quality factors have been maintained to be backward compatible with V4:

Qual_Temp_Profile_Top

pertains to the **TAIRStd** profile lying above **Press_mid_top_bndry**

Qual_Temp_Profile_Mid

pertains to the **TAIRStd** profile lying on or below **Press_mid_top_bndry**
and above **Press_mid_top_bndry**

Qual_Temp_Profile_Bot

pertains to the **TAIRStd** profile lying on or below **Press_bot_mid_bndry**

For these three quality factors:

0 = best, profile segment judged suitable for assimilation

1 = good, profile segment judged suitable for statistical climate studies

2 = profile segment rejected, researchers should not use

These new quality factors have been introduced in V5:

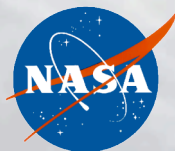
PBest indicates **TAIRStd** is “best” from TOA to **PBest** (mb)

nBestStd indicates **TAIRStd** is “best” for levels in the range $i=nBestStd, 28$
and a value of 29 indicates that none are “best”

PGood indicates **TAIRStd** is “good” from TOA to **PGood** (mb)

nGoodStd indicates **TAIRStd** is “good” for levels in the range $i=nGoodStd, 28$
and a value of 29 indicates that none are “good”

The **PBest** and **PGood** indicators allow a finer altitude discrimination of the point at which a retrieved temperature profile begins to encounter difficulties due to clouds that cannot be properly cleared. Thus yield is increased above the level of these problematic clouds over that resulting from the coarser quality flags of Version 4 data products (**Qual_Temp_Profile_***).



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Example (continued)

Atmospheric Infrared Sounder

AIRS Temperature Profile, TAIRStd, and Surface Air Temperature, TSurfAir

5. Caveats

Require input from Susskind, Barnet, JPL V5 testing and all other teams

6. Suggestions for Researchers

Require additional input from Susskind, Barnet, JPL V5 testing and all other teams

The careful researcher may find it useful to filter **Qual_Temp_Profile_Bot** by applying the additional acceptance condition, $0.0 < \mathbf{TSurfStdErr} < 5.0$.

The careful researcher may find it useful to filter **Qual_Temp_Profile_Mid** and **Qual_Temp_Profile_Top** by applying the additional acceptance condition, $0.0 < \mathbf{TAirStdErr} < 10.0$.



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Required Flow Charts

- **Retrieval Flow Charts**

- ***Side-by-Side V4 and V5 Comparison***

There have been major changes to the retrieval flow between Version 4 and Version 5. Users must be made aware of the subtle differences in retrieval paths, with detail sufficient to clearly elucidate the meaning of various values of RetQAFlag.

- **Quality Flag Flow Charts**

- ***Side-by-Side V4 and V5 Comparison***

New quality flags have been added, and the parameters which control the values of previous quality flags have been modified. Users comparing V4 and V5 may be confused when they find that previously “best” retrievals in V4 are now “good” or “do not use” in V5.



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Requested Contributions (due April 6, 2007)

Atmospheric Infrared Sounder

- **Susskind Team:**
 - *V4 vs V5 flow charts for Retrieval and for Quality Flags*
 - *Discussion of the retrieval and QA differences between V4 and V5 (graphics welcome)*
- **Barnet Team:**
 - *Quickstart writeup for CH₄ (cover all CH₄ products, graphics welcome)*
- **McMillan Team:**
 - *Quickstart writeup for CO (cover all CO products, graphics welcome)*
- **Strow Team:**
 - *Quickstart writeup for Dust Flag (graphics welcome)*
 - *Discussion of changes to RTA*
- **Rosenkranz Team:**
 - *Quickstart writeup for MW-only products (graphics welcome)*
 - *Discussion of MW-only retrieval differences between V4 and V5, including surface classification and tuning*
- **JPL Team:**
 - *Quickstart writeup for L1B radiances*
 - *Quickstart writeup for O₃ (cover all O₃ products, graphics welcome)*
 - *Quickstart writeup for surface products, cloud products, olr products tropopause products (graphics welcome)*
 - *Results of V5 testing (including graphics) and updates to Readers*
- **ALL TEAMS:**
 - *Hints, guidance and caveats to users based on your experience with the V5 products. How to use the Quality Factors, singly and in combination. Warnings about biases (physical and sampling), geospatial areas or conditions to avoid (and how to avoid). Simply put---the users are depending upon us to help them avoid pitfalls that will result in wasted research and bad publications. (graphics welcome)*